Wadeable Streams Assessment: A Collaborative Survey of the Nation's Streams EPA 841-B-06-002

Chapter 4 Conclusion and Next Steps

May 2006

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The United States covers an enormous and diverse landscape. Not surprisingly, the ecological condition of U.S. streams varies widely geographically. Forty-two percent of the nation's stream length is in poor biological condition. The most widespread or common stressors are nutrients (e.g., phosphorus and nitrogen), riparian disturbance, and excess streambed sediments. Nationally, the high levels of nutrients and excess sedimentation more than double the risk of poor biological condition.

The Eastern Highlands region has the highest amount of stream miles rated in poor condition. In this region, the Macroinvertebrate Index of Biotic Condition shows that 52% of the Eastern Highlands stream resource is in poor condition when compared to least-disturbed reference sites in the region. This is somewhat confounded by the deletion from the survey of small headwater streams in New England, which are both numerous and tend to be in better condition than larger streams.

Geographically, the nation's total stream length is not evenly distributed. The densest stream coverage is in the Eastern Highlands region, which has approximately 276,362 miles of perennial streams. The Plains and Lowlands region, which covers a large portion of the United States, has 242,256 miles of perennial streams, and 40% of these are rated poor. Although streams in the West appear to be in better condition when compared to least-disturbed reference condition (27% in poor condition), this region only has 152,425 miles of perennial streams, about 23% of the total stream length; therefore, it is important to evaluate the results in terms of both percentages and absolute stream miles. For example, the percentage of streams in good condition varies dramatically between the West and Plains and Lowlands regions – 45% in the West and 29% in Plains and Lowlands. If these percentages are converted to absolute length of stream, the West region has 68,851 miles in good condition, whereas the Plains and Lowlands region has 70,530 miles in good condition.

In addition to characterizing the condition of the nation's streams resource, the WSA provides a valuable opportunity to explore technical and programmatic elements of stream assessment. Important technical evaluations to follow this report will include the comparability studies being performed by a number of WSA partners. These studies will report on collected samples using a variety of sampling methods to explore the potential to integrate and share data from multiple sources. Another priority being addressed by states and EPA is an improved understanding of reference condition and how it is used to define expectations for the nation's waterbodies. EPA's Office of Science and Technology will also be evaluating WSA data in developing and evaluating water quality criteria for nutrients and excess streambed sediments. The WSA has, in short, provided a rich data set and sparked interest in many additional areas of investigation.

The WSA provides the first nationally consistent baseline of the condition of the nation's streams. This baseline will be used in future assessments to evaluate changes in conditions and to provide insights as to the effectiveness of water resource management actions. The Highlight on acidification trends and the Clean Air Act (below) illustrates how this type of survey can be used to evaluate the effectiveness of management actions on improving water quality. States, EPA, and other partners plan to use this approach to implement large-scale assessments of lakes in 2007, and of rivers, wetlands, and coastal waters in future years.

Highlight: Acidification Trends and the Clean Air Act

Although this WSA provides a snapshot of the current conditions in the nation's streams, future surveys will allow us to detect trends in stream conditions and in the stressors that affect them. One example in which probability-based survey designs were implemented repeatedly over the course of 10 years has been the evaluation of the responsiveness of acid-sensitive lakes and streams to changes in policy and management actions. Title IV of the 1990 Clean Air Act Amendments (CAAA) set target reductions for sulfur and nitrogen emissions from industrial sources as a means of reducing the acidity in deposition. One of the intended effects of the reductions was to decrease the acidity of low alkalinity waters. A 2003 EPA report assessed recent changes in surface water chemistry in the northern and eastern United States to evaluate the effectiveness of the CAAA (Stoddard et al., 2003). At the core of the monitoring, known as the TIME project, was the concept of a probability survey, where a set of sampling sites were chosen to be statistically representative of a target population. In the Northeast (New England and Adirondacks), this target population consists of lakes likely to be responsive to changes in rates of acidic deposition. In the Mid-Atlantic, the target population is upland streams with a high probability of responding to changes in acidic deposition. Repeated surveys of this population allowed an assessment of trends and changes in the number of acidic systems during the past decade. The trends reported in the following table are for recovery from chronic acidification. The analysis found that during the 1990s the amount of acidic waters in the target population declined. The number of acidic lakes in the Adirondacks dropped by 38% and the number of acidic lakes in New England dropped by 2%. The length of acidic streams declined by 28% in the Northern Appalachians.

Estimates of change in number and proportion of acidic surface waters in acid-sensitive regions of the North and East. Estimates are based on applying current rates of change in Gran ANC[a] to past estimates of population characteristics from probability surveys.

Region	Population Size							
New England	6,834 lakes	386 lakes	5.6%	1991-1994	+0.3	374 lakes	5.5%	-2%
Adirondacks	1830 lakes	238 lakes	13.0%	1991-1994	+0.8	149 lakes	8.1%	-38%
No. Appalachians	42,426 km	5,014 km	11.8%	1993-1994	+0.7	3,600 km	8.5%	-28%

[a] For both Northeast lakes and mid-Atlantic streams, waterbodies with acid-neutralizing capacity (using the analytical technique of Gran titration, with the result know as "Gran ANC") of < 100 μeq/L are particularly vulnerable.

[b] Number of lakes/streams with Gran ANC<0 in past probability survey (data collected at "Time Period of Estimate", in column 5).

[c] Percent of population (from Column 2) with Gran ANC<0 in past probability survey (data collected at "Time Period of Estimate", in column 5).

[d] Based on regional trends in μeq/L/year.

[e] Based on trends from repeated surveys through 2001.